SOUTH AUSTRALIAN WINE INDUSTRY
ASSOCIATION INCORPORATED

2XE

WEBINAR HOSTED BY
ASVO

Government of South Australia
Green Industries SA

Electricity Demand Management

Practical steps for the SA Wine Industry

SOUTH AUSTRALIAN WINE INDUSTRY
ASSOCIATION INCORPORATED

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South Australian Wine Industry

- *Established in 1840, the South Australian Wine Industry Association is the peak body representing the viticultural and winemaking interests of the state.*
- *The association provides practical information and advice to members on a wide range of topics - industrial relations, OHS, environment, viticulture and export, to name a few.*

Government of South Australia
Green Industries SA

2XE

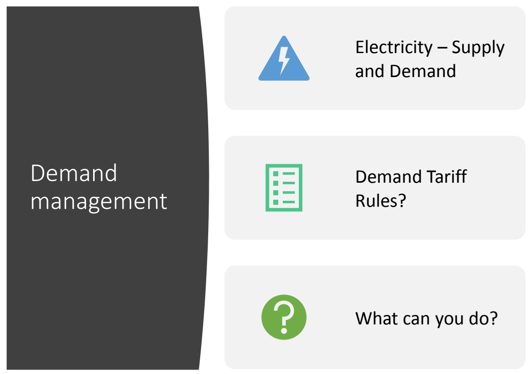
Green Industries SA

- Green Industries SA helps develop the green economy in response to the demand for clean and green produce, and the reduction of emissions to air, water and soil from industry.
- Green Industries SA promotes the more efficient use of resources, and the conservation and recovery of scarce resources.

2XE

2XE

- 2XE assists clients adapt to the changing environment through strategic transformation, adoption of engineering technologies and best practices to increase business efficiency.
- 2XE works with businesses to become more resource efficient by improving energy, water, material and time



Demand management

- Electricity – Supply and Demand
- Demand Tariff Rules?
- What can you do?

1. Supply and Demand

Electricity distribution

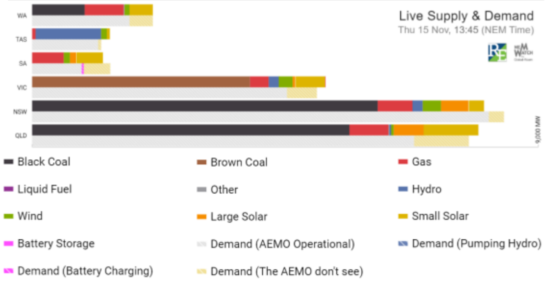
Continual state of **change**

Electricity **demand** varies every minute

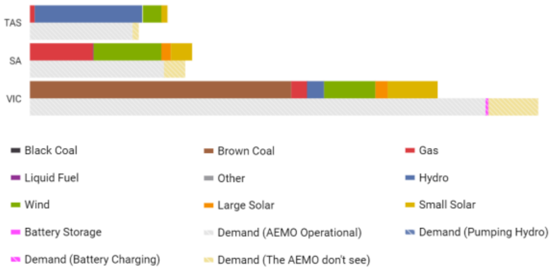
Electricity **supply** by **renewables** varies every minute

Electricity **supply** by all **other sources** needs to balance demand

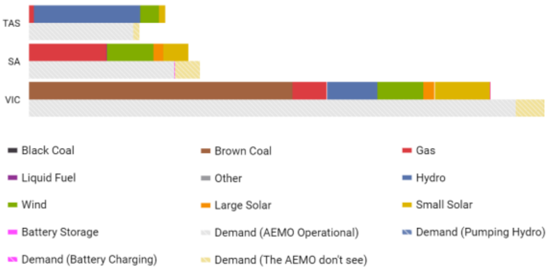
Supply and Demand



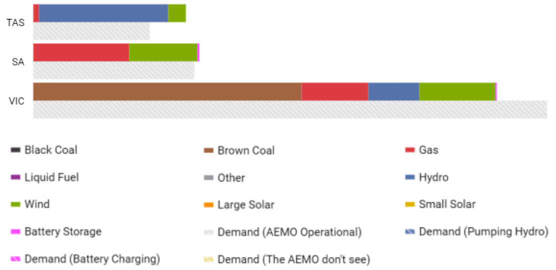
Supply and Demand



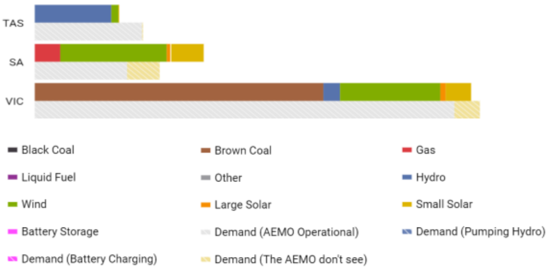
Supply and Demand



Supply and Demand



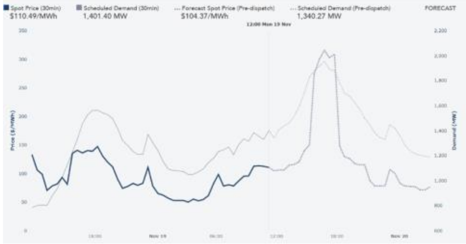
Supply and Demand



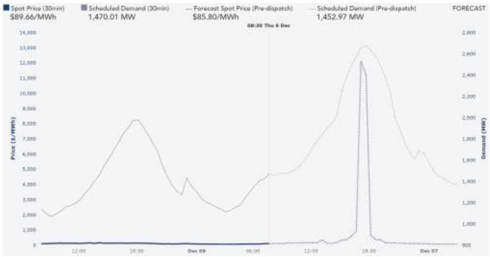
Cost of electricity

- Your retailer will set a price for your electricity
- The actual cost of electricity will vary A LOT
- 1c/kWh - $1.kWh in the real market
- High demand = expensive electricity
- Low demand = cheap electricity

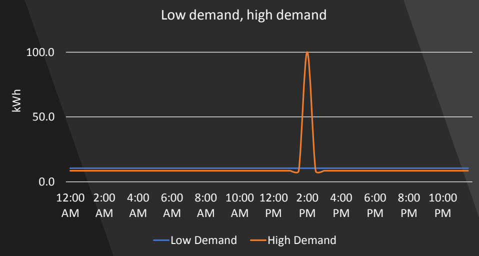
Supply and Demand



Supply and Demand

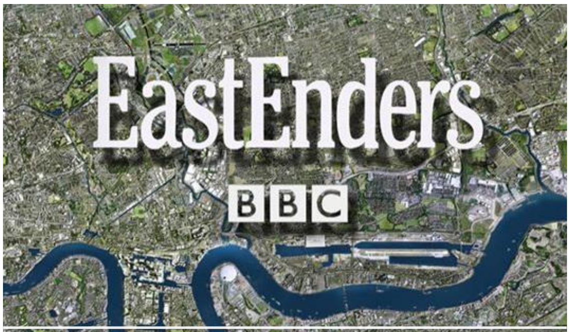


Both use 500kWh per day



What is peak demand and why is it important

- Highest quantity of electricity in single a single instant
- Occurs when EVERYONE is using intensive equipment (Air Conditioners, refrigeration, electrolysis, etc)
- Cause huge strain on transmission infrastructure (lines, substation, transformers, etc.)
- 2017/2018 Second warmest summer on record
- Need infrastructure to keep up with demand
- No longer use rolling blackouts to decrease demand



Peak demand – TV pickup

Demand management Tariffs 2015 – Why?

- Aging infrastructure
- Heat waves / home AC 'peaks'
- Sizing infrastructure
- Incentivise customers
- Change behaviour
- Balanced, flattened load

Background – demand tariff rollout

2015 – 2017	Automatic roll-over of all large businesses (>160MWh) to demand
2017 – 2020	Second wave - small business customers (<160MWh)
Transition	Transition period prior to full demand

What does this mean for the wine industry?

- If you're not already on a demand tariff, you soon will be
- Need to come up with strategies to manage demand charges
- To manage demand charges, you need to understand the rules

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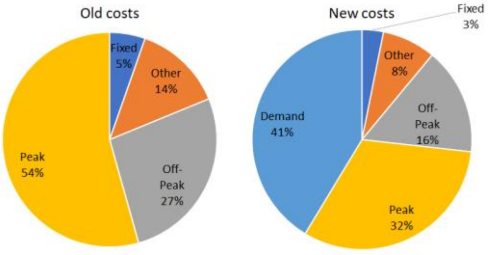
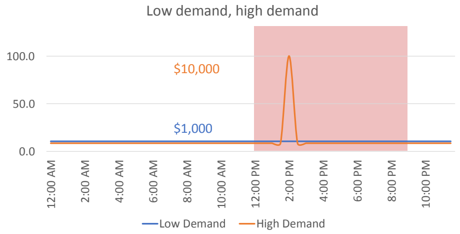
2. Demand Tariffs and opportunities

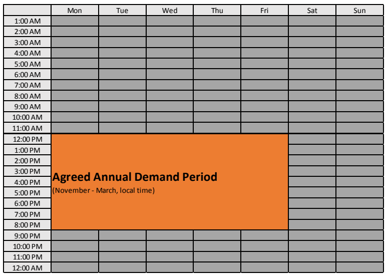
Comparison of old and new bills



Both use 500kWh per day



What is a demand charge (average over 30 minutes)



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11:00 AM							
12:00 PM	**Agreed Annual Demand Period** (November - March, local time)						
1:00 PM							
2:00 PM							
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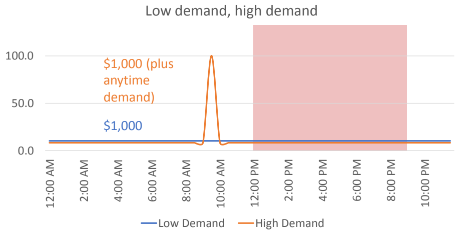
Both use 500kWh per day



Business Network Tariff

TWO MAIN CATEGORIES
(NO CHOICE)

SMALL BUSINESS (LESS THAN 160MWH PER ANNUM)

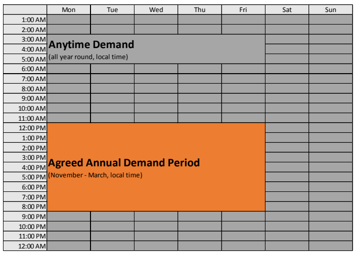
LARGE BUSINESS (GREATER THAN 160MWH PER ANNUM)

TWO TARIFF TYPES
(CHOICE)

AGREED

ACTUAL

Agreed Tariff



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3:00 AM	**Anytime Demand** (all year round, local time)						
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7:00 AM							
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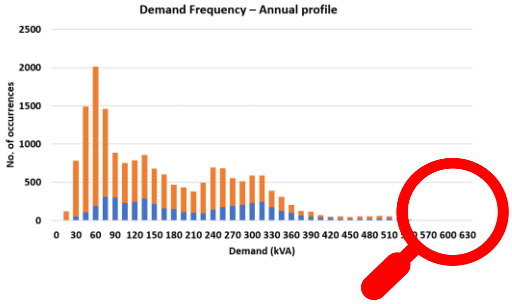
12:00 AM							

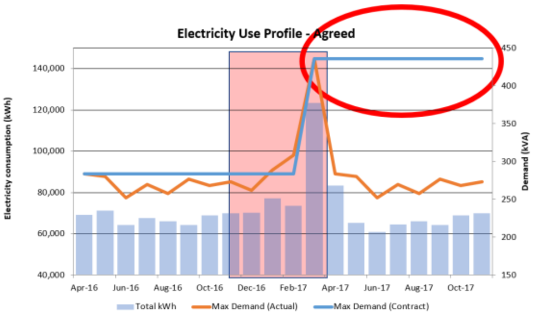
Agreed Tariff

Components	Measurement	Charging parameter
Fixed	$/customer/day	Fixed supply charge per annum
Usage	$/kWh	Anytime based on usage
Demand	$/kVA/day	Maximum demand charge based on average maximum demand (30mins) November to March between 12pm – 9pm on working days and charged in a declining block • Block 1: 0-1,000kVA, charged at a higher rate • Block 2: >1,000kVA, charged at a lower rate
Additional Demand	$/kVA/day	Maximum demand charge if anytime demand exceeds agreed demand (Additional demand – Anytime demand – Annual demand) and is charged at a lower rate.

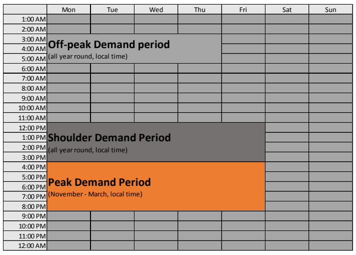
One peak over 30 minutes sets your annual demand



Agreed Use



Actual Tariff



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3:00 AM	**Off-peak Demand period** (all year round, local time)						
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5:00 AM							
6:00 AM							
7:00 AM							
8:00 AM							
9:00 AM							
10:00 AM							
11:00 AM							
12:00 PM	**Shoulder Demand Period** (all year round, local time)						
1:00 PM							
2:00 PM							
3:00 PM							
4:00 PM	**Peak Demand Period** (November - March, local time)						
5:00 PM							
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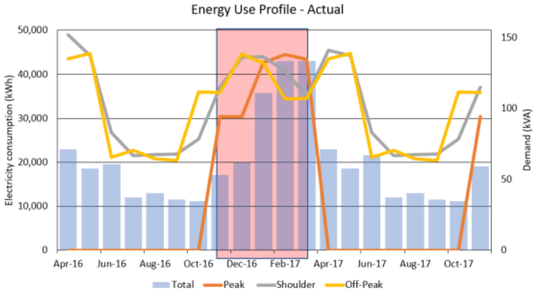
12:00 AM							

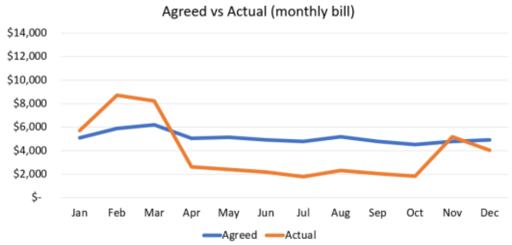
Actual Tariff

Components	Measurement	Charging parameter
Fixed	$/customer/day	Fixed supply charge per annum
Usage	$/kWh	Anytime based on usage
Demand	$/kVA/day	Maximum demand charge based on average maximum demand (30mins) • Shoulder: 12pm – 4pm on working days, all year round • Peak: 4pm – 9pm on working days, November – March Currently Off-peak demand is measured, however not charged.

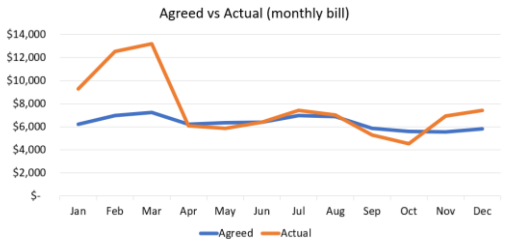
Actual Use



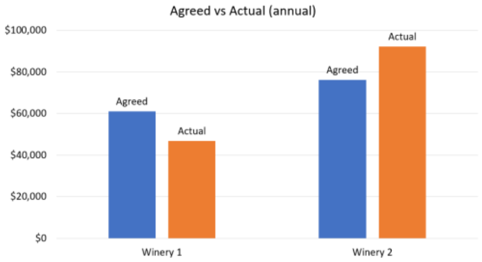
Tariff structures



Tariff structures



Which one is better?



Which is better for you? Agreed or actual?

- Hard to work out yourself
- Hard to get help from retailers or SAPN
- Best to run data through a simulator
- Talk with an energy expert

3. Demand management strategies

What can you do?

- Get the right data
- Understand your electricity use
- Put management strategies in place
- Use technology

Getting the right data

Getting the right data

- What do your electricity bills tell you?
- What does your interval meter data tell you?
- What can submetering tell you?
- How do you manage demand using data?

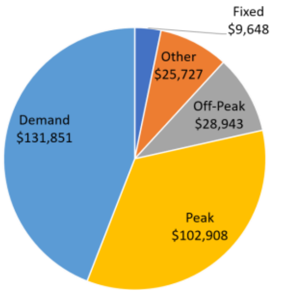
What do your electricity bills tell you?

WHERE ARE THE PROBLEMS?

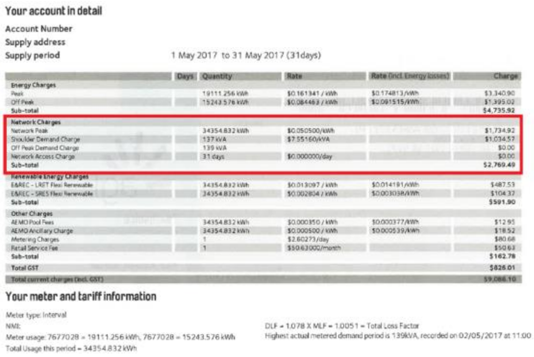
THE SIZE OF THE PROBLEM?

THE BUSINESS CASE FOR CHANGE

Energy Bills - Data


Annual breakdown of electricity charges

Energy Bills – **Actual** demand


Your account in detail

Account Number
Supply address
Supply period 1 May 2017 to 31 May 2017 (31days)

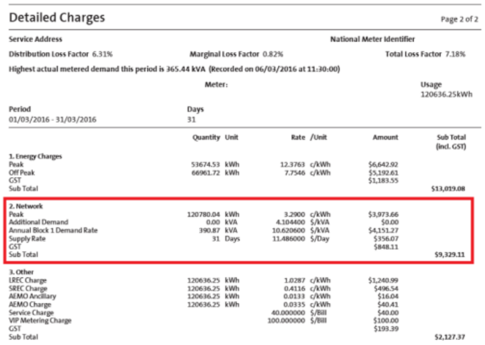
	Days	Quantity	Rate	Rate (incl. Energy losses)	Charge
Energy Charges					
Peak		19111.256 kWh	$0.161341 / kWh	$0.174813/kWh	$3,340.90
Off Peak		15243.576 kWh	$0.084463 / kWh	$0.091515/kWh	$1,395.02
Sub-total					**$4,735.92**
Network Charges					
Network Peak		34354.832 kWh	$0.050500/kWh		$1,734.92
Shoulder Demand Charge		137 kVA	$7.55160/kVA		$1,034.57
Off Peak Demand Charge		139 kVA			$0.00
Network Access Charge		31 days	$0.000000/day		$0.00
Sub-total					**$2,769.49**
Renewable Energy Charges					
E&REC - LRET Flexi Renewable		34354.832 kWh	$0.013097 / kWh	$0.014191/kWh	$487.53
E&REC - SRES Flexi Renewable		34354.832 kWh	$0.002804 / kWh	$0.003038/kWh	$104.37
Sub-total					**$591.90**
Other Charges					
AEMO Pool Fees		34354.832 kWh	$0.000350 / kWh	$0.000377/kWh	$12.95
AEMO Ancillary Charge		34354.832 kWh	$0.000500 / kWh	$0.000539/kWh	$18.52
Metering Charges		1	$2.60273/day		$80.68
Retail Service Fee		1	$50.63000/month		$50.63
Sub-total					**$162.78**
Total GST					**$826.01**
Total current charges (incl. GST)					**$9,086.10**

Your meter and tariff information

Meter type: Interval
NMI:
Meter usage: 7677028 = 19111.256 kWh, 7677028 = 15243.576 kWh
Total Usage this period = 34354.832 kWh

DLF = 1.078 X MLF = 1.0051 = Total Loss Factor
Highest actual metered demand period is 139kVA, recorded on 02/05/2017 at 11:00

Energy Bills – **Agreed** demand


Detailed Charges Page 2 of 2

Service Address **National Meter Identifier**

Distribution Loss Factor 6.31% **Marginal Loss Factor** 0.82% **Total Loss Factor** 7.18%

Highest actual metered demand this period is 365.44 kVA (Recorded on 06/03/2016 at 11:30:00)

Meter: **Usage** 120636.25kWh

Period 01/03/2016 - 31/03/2016 **Days** 31

	Quantity	Unit	Rate	/Unit	Amount	Sub Total (incl. GST)
1. Energy Charges						
Peak	53674.53	kWh	12.3763	c/kWh	$6,642.92	
Off Peak	66961.72	kWh	7.7546	c/kWh	$5,192.61	
GST					$1,183.55	
Sub Total						**$13,019.08**
2. Network						
Peak	120780.04	kWh	3.2900	c/kWh	$3,973.66	
Additional Demand	0.00	kVA	4.104400	$/kVA	$0.00	
Annual Block 1 Demand Rate	390.87	kVA	10.620600	$/kVA	$4,151.27	
Supply Rate	31	Days	11.486000	$/Day	$356.07	
GST					$848.11	
Sub Total						**$9,329.11**
3. Other						
LREC Charge	120636.25	kWh	1.0287	c/kWh	$1,240.99	
SREC Charge	120636.25	kWh	0.4116	c/kWh	$496.54	
AEMO Ancillary	120636.25	kWh	0.0133	c/kWh	$16.04	
AEMO Charge	120636.25	kWh	0.0335	c/kWh	$40.41	
Service Charge			40.000000	$/Bill	$40.00	
VIP Metering Charge			100.000000	$/Bill	$100.00	
GST					$193.39	
Sub Total						**$2,127.37**

What does your interval meter data tell you?

How and when you use electricity

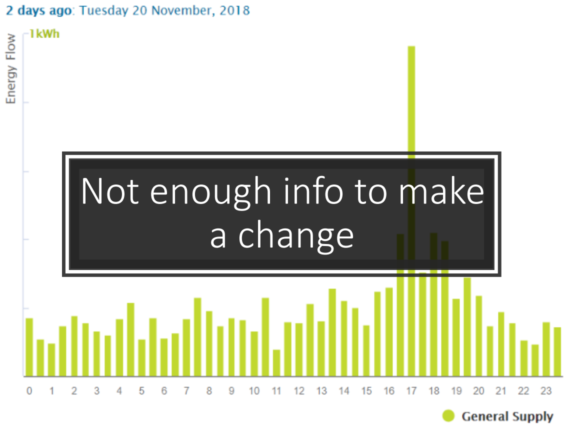
Can be used to identify improvement projects

Current State – Interval data

- Critical step!
- Gives you the information you need to understand and manage your energy
- Hard to get in a useful format
- 3rd Party energy dashboard are growing

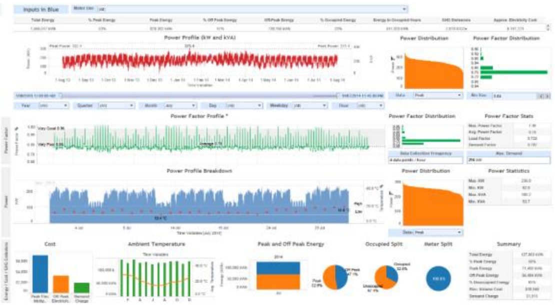
How do you get your interval data?

- SAPN (Raw data only – Not useful)
- Retail data (Daily data, but not always 30 minutes)



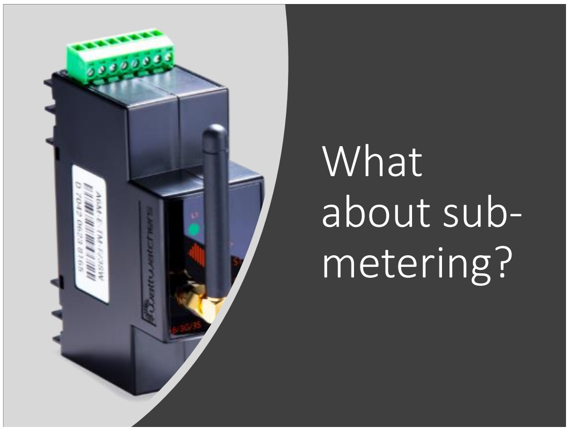
Not enough info to make a change

Great data!



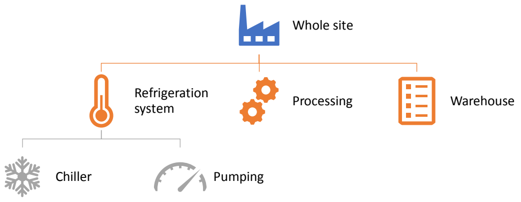
What can good data give you?

- WHEN AND HOW YOUR ARE USING ELECTRICITY
- WHEN YOU CAN LOAD SHED
- WHAT CAUSES YOUR 'PEAK DEMAND'
- WHAT IS YOUR 'POWER FACTOR'
- WHICH TARIFF IS THE BEST FOR YOU?
- WHAT IS YOUR DEMAND FREQUENCY?
- HOW DO YOU SAVE MONEY



What about sub-metering?

Sub-metering



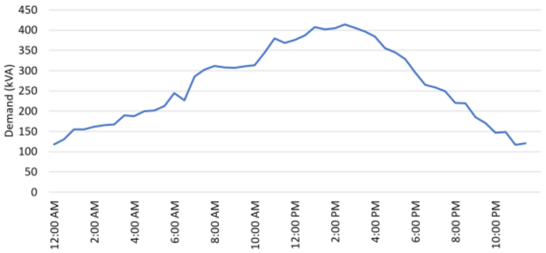
Sub-metering

- Detailed energy use of sub-systems
- Easier to identify opportunities
- First step towards automated demand management
- Helps you conduct preventative maintenance

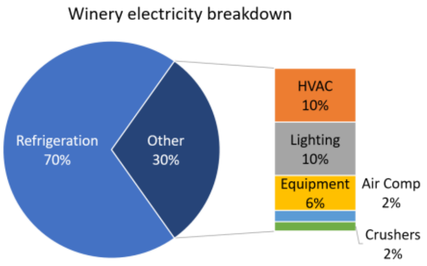
Submetering Data

Demand-side opportunities

Typical daily demand during vintage



Where is electricity used in your winery?



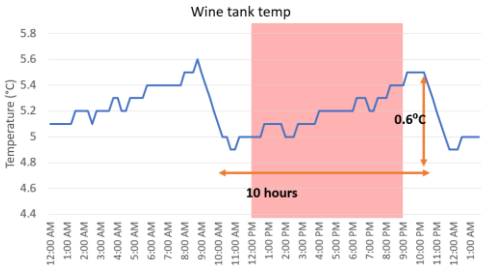
Refrigeration – biggest area of opportunity

QUESTION: What makes wineries different?

- High seasonal use and electricity costs
- Huge volumes of thermal storage
- One of the few industries that CAN manage demand by changing practices

Regardless of insulation, wine takes time to warm up.

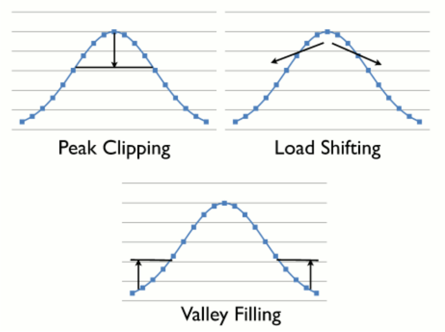
24kL Tank, 40°C day



What can you do?

- Conscious decision making about how and when you cool wine
- A range of opportunities to choose from
- Need to have a balanced approach

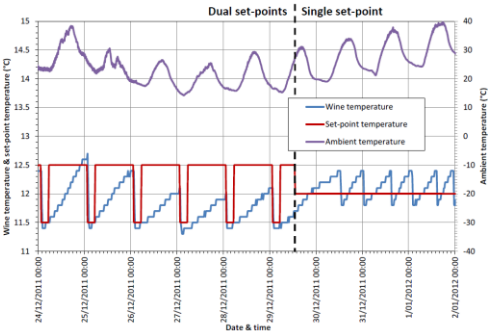
What you want your demand to look like



Load shifting & Valley filling in refrigeration

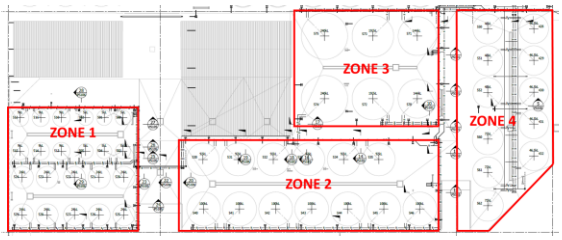
- Complete the bulk of refrigeration outside of peak period
- Refrigerate tank farm in zones to reduce peak refrigeration loading
- Don't cool tank farm while chilling must or ferments

Night time chilling (dual setpoint)



Load scheduling practices

Cool tank farm in zones. Don't try to do everything at once. More efficient and reduces demand



Load Scheduling example (automation)

- St. Halletts process 3,000 tons annually and began using the load scheduling module in 2011.
- Prior to this, power consumption was significantly higher with maximum demand peaks of 500kVA.
- VinWizard load scheduling has allowed the winery to shift power consumption from the hot day hours to the cooler evening hours.
- This has resulted in a 50% reduction in maximum demand and major power savings in the range of 25-35%.

Demand shedding when nearing maximum demand

Turn off low priority tanks

Increase brine setpoint temperature

Demand shedding

Manual

- Need to monitor onsite electricity demand
- Need to be alerted when nearing peak demand
- Have a staff member prepared to turn off low-priority tanks and increase brine temperature set-point
- Low cost solution – no guaranteed demand reduction

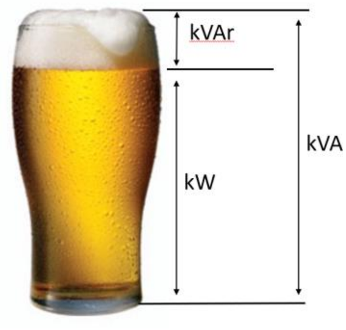
Automatic

- Need to monitor onsite electricity demand
- Need to have an automatic control system to turn off low-priority tanks and increase brine temperature set-point
- High cost solution – more likely to reduce peak demand if correctly configured

Supply-side opportunities

Power Factor

- You pay for the whole glass (kVA)
- You only get to drink the beer (kW)
- The head is waste! (kVAr)

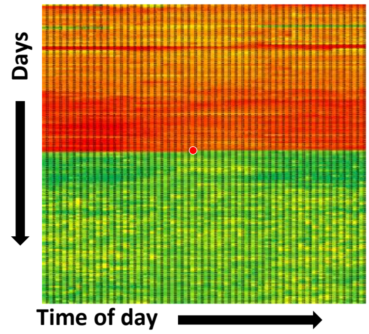


Power Factor Correction Unit

How can we fix poor power factor?

Power Factor Correction Units

Power Factor Correction



On an Agreed Tariff.

Maximum demand = 540kVA
Power Factor at Maximum demand = 0.7

30% of demand is being wasted!

New Maximum demand = 378kVA
Savings = 162kVA

Cost saving of ~$20,000 per annum

Solar PV

- Good if you use energy all year round
- Not applicable for demand management as there is no certainty that the sun will be shining during peaks

~40c/kWh

20-30c/kWh

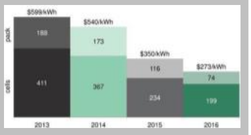
Diesel Generators

- Some generators can supplement your energy supply – a lot can't
- Advanced software systems can automatically turn Gensets on when demand is nearing peak
- Correctly implemented demand shedding can provide large savings

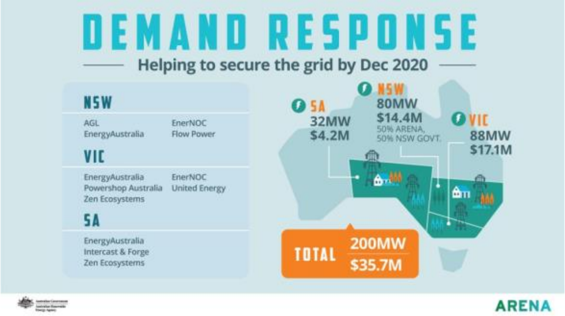
Battery Storage

Expensive at the moment,
But prices are falling quickly!

Similar to gensets, if battery storage systems are correctly integrated they can be used to automatically reduce peak demand.



What’s on the Horizon?



DEMAND RESPONSE

Helping to secure the grid by Dec 2020

NSW	
AGL EnergyAustralia	EnerNOC Flow Power

VIC	
EnergyAustralia Powershop Australia Zen Ecosystems	EnerNOC United Energy

SA
EnergyAustralia Intercast & Forge Zen Ecosystems

What is demand response?

- Working with retailers to schedule loads
- Using smart battery storage to secure a reliable source of reserve power
- Optimise existing assets to curtail usage during peak demand times
- Install monitoring and remote control capabilities to remotely curtail demand

Summary

Opportunity Summary

Check
- Check tariff (agreed or actual) and ensure it’s the most cost effective

Install
- Install monitoring and take advantage of the information

Change
- Change the way you use electricity for refrigeration

Analyse
- Analyse your Power Factor and correct it if necessary

Consider
- Consider the potential of battery technology and demand response moving forwards

Next Steps – EOI Onsite investigation

- WHERE ARE THE OPPORTUNITIES AT YOUR WINERY?
- ANALYSIS OF YOUR DATA (ELECTRICITY BILLS, INTERVAL DATA, REFRIGERATION LOGS)
- WHICH TARIFF IS RIGHT FOR YOU? HOW’S YOUR POWER FACTOR
- INVESTIGATION OF SUBMETERING
- NO COST / LOW COST PROJECTS
- BUSINESS CASE (COST / BENEFIT) FOR ADVANCED DEMAND MANAGEMENT SOLUTIONS